CLAIMS

What is claimed is:

1. A process of producing a fluorided catalyst metallocene catalyst component comprising contacting a nitrogenous metallocene compound with a fluoriding agent comprising a fluorided acid for a time sufficient to form a fluorided metallocene catalyst compound.

2. The process of claim 1, wherein the nitrogenous metallocene catalyst compound is described by the formulae

$$Cp^ACp^BMX_n \text{ and } Cp^A(A)Cp^BMX_n$$

wherein M is a Group 4, 5 or 6 atom;

Cp^A and Cp^B are each bound to M and are the same or different and are selected from the group consisting of cyclopentadienyl, indenyl, tetrahydroindenyl, fluorenyl, and substituted derivatives of each;

(A) is a divalent bridging group bound to each of Cp^A and Cp^B;

n is 0, 1 or 2; and

X is selected from the group consisting of amides, amines, imines, nitriles and combinations thereof.

3. The process of claim 2, wherein X is described by the formula $-N(R^\alpha)_2$, wherein each R^α is independently selected from C_1 to C_{10} alkyls, C_6 to C_{20} aryls, C_7 to C_{21} alkylaryls, C_7 to C_{21} arylalkyls, and halide, carboxylate silyl or hydroxy-substituted versions thereof; wherein any two R^α groups may form a ring system of from 4 to 10 carbons that may also comprise an atom selected from Groups 13-16.

4. The process of claim 1, wherein the fluoriding agent is a fluorided anhydrous acid.

5. The process of claim 1, wherein from 1 to 10 equivalents of fluoriding agent are contacted with the nitrogenous metallocene compound.

6. The process of claim 1, wherein the fluoriding agent is selected from the group consisting of HF, HBF_4, HPF_6, HBF_4OMe_2 and combinations thereof.

7. The process of claim 2, wherein n is 2.

8. The process of claim 2, wherein the Cp^A and Cp^B are selected from the group consisting of substituted cyclopentadienyl and substituted tetrahydroindenyl; the substituent groups selected from the group consisting of C_1 to C_{10} alkyls and C_6 to C_{20} aryls.

9. The process of claim 7, wherein the substituent groups are selected from C_1 to C_6 alkyls.

10. The process of claim 2, wherein M is zirconium or hafnium.

11. The process of claim 1, wherein contacting the nitrogenous metallocene compound with the fluoriding agent subsequently forms an organic compound and a neutral nitrogenous compound and additionally comprising separating the neutral nitrogenous compound from the organic compound to form the fluorided metallocene catalyst compound.

12. The process of claim 2, wherein (A) is selected from divalent C_1 to C_5 hydrocarbons and silicon-containing hydrocarbons.

13. The process of claim 1, wherein contacting the nitrogenous metallocene compound with the fluoriding agent results in a fluorided metallocene compound yield of 50% or more.

14. The process of claim 1, wherein contacting the nitrogenous metallocene compound with the fluoriding agent results in a fluorided metallocene compound yield of 80% or more.

15. The process of claim 1, wherein contacting the nitrogenous metallocene compound with the fluoriding agent results in a fluorided metallocene compound yield of 90% or more.

16. The process of claim 2, wherein M is zirconium.

17. The process of claim 1, further comprising drying the fluorided metallocene compound in the presence of magnesium sulfate.

18. The process of claim 1, wherein contacting the nitrogenous metallocene compound with the fluoriding agent comprises contacting the nitrogenous metallocene compound with 2 or more equivalents of the fluoriding agent.

19. The process of claim 1, wherein contacting the nitrogenous metallocene compound with the fluoriding agent comprises contacting the nitrogenous metallocene compound with 2 or less equivalents of the fluoriding agent.

20. A process of producing a polyolefin comprising combining a metallocene catalyst system comprising a fluorided metallocene catalyst component and monomers selected from the group consisting of ethylene and C_3 to C_{12} olefins; wherein the fluorided metallocene catalyst component is produced by contacting a nitrogenous metallocene compound with a fluoriding agent for a time sufficient to form a fluorided metallocene catalyst compound, followed by isolation of the fluorided metallocene catalyst compound and formation of a metallocene catalyst system.

21. The process of claim 20, wherein the nitrogenous metallocene catalyst compound is described by the formulae

$Cp^ACp^BMX_n$ and $Cp^A(A)Cp^BMX_n$

wherein M is a Group 4, 5 or 6 atom;

Cp^A and Cp^B are each bound to M and are the same or different and are selected from the group consisting of cyclopentadienyl, indenyl, tetrahydroindenyl, fluorenyl, and substituted derivatives of each;

(A) is a divalent bridging group bound to each of Cp^A and Cp^B;

n is 0, 1 or 2; and

X is selected from the group consisting of amides, amines, imines, nitriles and combinations thereof.

22. The process of claim 21, wherein X is described by the formula $-N(R^\alpha)_2$, wherein each R^α is independently selected from C_1 to C_{10} alkyls, C_6 to C_{20} aryls, C_7 to C_{21} alkylaryls, C_7 to C_{21} arylalkyls, and halide, carboxylate silyl or hydroxy-substituted versions thereof; wherein any two R^α groups may form a ring system of from 4 to 10 carbons that may also comprise an atom selected from Groups 13-16.

23. The process of claim 20, wherein the fluoriding agent is a Bronsted acid comprising fluorine.

24. The process of claim 20, wherein the fluoriding agent is a fluorided anhydrous acid.

25. The process of claim 20, wherein the olefins are selected from the group consisting of ethylene and C_3 to C_{12} α-olefins.

26. The process of claim 20, wherein the olefins and catalyst system are combined in a fluidized bed gas phase reactor at a polymerization temperature of from 50°C to 120°C.

27. The process of Claim 20, wherein the catalyst system further comprises a support material.

28. The process of Claim 27, wherein the support material is silica calcined at a temperature of from 800°C to 900°C.

29. The process of Claim 28, wherein the catalyst system further comprises an alumoxane activator.

30. The process of Claim 20, wherein the metallocene catalyst system further comprises a Ziegler-Natta catalyst component or a Group 15-containing catalyst component.

31. The process of Claim 20, wherein a polyolefin is produced having a density in the range of from 0.880 to 0.925 g/cm^3.

32. The process of Claim 30, wherein the bimodal polyolefin is produced having a density in the range of from 0.930 to 0.970 g/cm^3.

33. A film made from the process of Claim 31.

34. A film or pipe made from the process of Claim 32.